

Dr.V.S.KRISHNA GOVT. DEGREE COLLEGE (AUTONOMOUS) NODAL RESOURCE CENTRE & AU CENTRE FOR RESEARCH Maddilapalem, Visakhapatnam - 530013, Andhra Pradesh. 0891-2553262, https://www.drvskrishnagdc.edu.in



DEPARTMENT OF BOTANY

CO – PO ATTAINMENT METHODOLOGY

Step 1

Calculation of Course Outcome Weighted Average (COWA)

The performance of the students assessed by two methods

- (a) Direct Assessment: The weightage for internal exams is 30% and for semester end exams is 60%
- (b) Indirect assessment: 5% weightage for exit survey and 5% for extracurricular activities

The performance of the student is categorised in four levels

S,No	Percentage obtained by the student	Level weightage
	in DA and IDA	
1	Less than 35%	0
2	Between 35% and 50%	1
3	Between 51% and 70%	2
4	Above 70%	3

The average level of all students for a particular course is found. It is called as course outcome weighted average (COWA).

$\mathbf{COWA} = \frac{\textit{some of the level weitage of all students of a course}}{\textit{total number of students}}$

➢ Step 2:

Calculation of Course outcome level index (COLLI):

To Map the course outcomes (COs) of a course with Blooms levels (1 to 6) by using action verbs used in CO's. A course outcome may be mapped to multiple Blooms levels; hence we need to calculate the average Blooms level weightage (ABLW).

 $COLLI = \frac{Sum of the weigtages of blooms levels mapped}{number of levels mapped}$

➤ Step 3:

CO-PO mapping and CO-PSO mapping

Map each course outcome with POs and PSOs in levels 0,1,2,3. A CO may be mapped to multiple POs or PSOs with different levels 1,2,3. The weighted average of each PO is to be calculated.

➤ Step 4:

Calculation of CO attainment:

The formula for Course Outcome Attainment (CO Attainment) can be calculated by using below formula

CO attainment = COWA +
$$\left\{ (3 - COWA) \times \left(1 - \frac{COLLI}{3.5} \right) \right\}$$

(Blooms Level Weighted Average value = 3.5)

➤ Step 5:

Calculation of PO attainment:

The formula for Programme Outcome Attainment (PO Attainment) can be calculated by using below formula

PO Attainment = $\frac{\Sigma(CO \ attainment)(PO \ level \ mapped \ with \ CO)}{Sum \ of \ the \ PO \ levels \ mapped \ with \ CO}$

PSO attainment:

The formula for Programme Specific Outcome Attainment (PSO Attainment) can be calculated by using below formula

 $PSO Attainment = \frac{\Sigma(CO \ attainment)(PSO \ level \ mapped \ with \ CO)}{Sum \ of \ the \ PSO \ levels \ mapped \ with \ CO}$



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DEPARTMENT OF BOTANY

POs & COs MAPPING 2021-2022

Department of Botany

Programme Name: BSc. BZC

Levels of Bloom's Taxonomoy

Level-1	Knowlede/Remember
Level-2	Understand
Level-3	Application
Level-4	Analyze
Level-5	Evaluation
Level-6	Create

Bloom's Taxonomy



POs	Programme Outcomes
DO1	
POI	Ability to take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
PO2	Effective Communication: Ability to speak, read, write, and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media, and technology.
PO3	Social Interaction: Ability to elicit views of others, mediate disagreements and help reach conclusions in group settings.
PO4	Effective Citizenship: Ability to demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
PO5	Ethics: Ability to recognize different value systems includingy our own, understand the moral dimensions of your decisions, and accept responsibility for them.
PO6	Environment and Sustainability: Ability to understand the issues of environmental contexts and sustainable Development.
PO7	Employabilityskills: Equipping graduates with the essential abilities and knowledge to excel in their choosen careers.
PO8	Entrepreneurships kills: Seeks to empower students with the competencies needed to be successful entrepreneours, enabling themto launch, operate, and innovate in their own businesses or entrepreneurial ventures.
PO9	Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes.

PSOs	Program Specific Outcomes (PSOs)							
PSO1	Analyze the relationships among animals, plants and microbes							
PSO2.	Understand the nature and basic concepts of anatomy, embryology And Plant Ecology.							
PSO3	Understand structure of Cell and functions of cell organelles. Plant breeding ; Biochemistry , Plant Physiology and Plant Biotechnology; EconomicBotany.							
PSO4	Understand the concept of gene, Heredity and Hybridization							
PSO5	Know and understand different Physiological functions and Biochemical pathways in Plants and cell.							
PSO6	Understand, identify and utilize different Economically useful Plants in life.							
PSO7	Perform procedures as per laboratory standards in the areas of plant Anatomy, Embryology, Ecology, CellBiology, Plant Breeding, Plant Physiology and Plant Biotechnology.							

COURSE OUTCOMES

SEMESTER – 1 P-I: FUNDAMENTAL OF MICROBES AND NON- VASCULAR PLANTS

CO1: The structure in relation to function of cells the fundamental unit of life, are concerned in this course along with molecular present in cells and the flow they make the basic framework of cells and their continuity

CO2: awareness created on diversity on Algae,

Fungi & lichens Fungi & lichens

CO3: knowledge created on microbial diversity

CO4: compare and anlyse the difference between

Eubacteria, archi bacteria and cyano bacteria

Co5: the students get knowledge about economic

importance of Microbes

Learning Outcomes:On Completion of the course, the students will be able to	Knowledge level (Bloom's Taxonomy)	Average Level weightage
CO1: The structure in relation to function of cells the fundamental unit of life, are concerned in this course along with molecular present in cells and the flow they make the basic framework of cells and their continuity	Level1(Knowledge) Level2(Understanding)	1.5
CO2:Awareness created on diversity on Algae Fungi& lichens	Level1(Knowledge) Level2(Understanding)	1.5
CO3: knowledge created on microbial diversity	Level1(Knowledge) Level2(Understanding) Level3(Application)	2
CO-4: compare and anlyse the difference between Eubacteria, archi bacteria and cyano bacteria	Level3(Application) Level4(Analysing) Level5(Evaluation)	4
CO5: The students get knowledge about economic importance of microbes	Level2(Understanding) Level3(Applying) Level4(Analysing) Level5(Evaluation)	3.5

1-Low, 2-Moderate, 3-High, '-' No Correlation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	0	1	1	0	2	1	1	3
CO2	2	0	0	0	1	2	1	2	1
CO3	1	1	0	2	2	1	1	0	2
CO4	1	1	0	1	1	2	1	0	2
CO5	3	2	2	2	2	2	3	2	2

CO-PSO Mapping

1-Low, 2-Moderate, 3-High, '-' No Correlation

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	1	2	2	1
CO2	1	2	1	2	1	1
CO3	2	2	1	3	1	1
CO4	1	1	1	2	1	1
CO5	2	1	1	1	1	3

ATTAINMENT OF POs

PROGRAM OUTCOMES ATTAINMENT											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9		
CO 1	5.58122 4	0	2.790612	2.790612	0	5.581224	2.790612	2.790612	8.371837		
CO2	5.58122 4	0	0	0	2.79061 2	5.581224	2.790612	5.581224	2.790612		
СОЗ	2.72081 6	2.720816	0	5.441633	5.44163 3	2.720816	2.720816	0	5.441633		
CO4	2.44163 3	2.441633	0	2.441633	2.44163 3	4.883265	2.441633	0	4.883265		
CO 5	7.53428 6	5.022857	5.022857	5.022857	5.02285 7	5.022857	7.534286	5.022857	5.022857		
FINAL ATTAI NMEN T	2.65102	2.546327	2.60449	2.616122	2.61612	2.643265	2.611137	2.678939	2.65102		

PROGRAM SPECIFIC OUTCOMES ATTAINMENT									
	PSO1	PSO2	PSO3	PSO4	PSO5				
CO 1	8.371837	8.371837	2.790612	5.581224	5.581224				
CO2	2.790612	5.581224	2.790612	5.581224	2.790612				
CO3	5.441633	5.441633	2.720816	8.162449	2.720816				
CO4	2.441633	2.441633	2.441633	4.883265	2.441633				
CO 5	5.022857	2.511429	2.511429	2.511429	2.511429				
FINAL ATTAINMENT	2.674286	2.705306	2.65102	2.671959	2.674286				

I B.Sc., -Botany-I/ I Semester End

FUNDAMENTAL OF MICROBES AND NON- VASCULAR PLANTS

UNIT – I: ORIGIN OF LIFEANDVIRUSES 12 Hrs.

- 1. Origin of life, concept of primary Abiogenesis; Miller and Urey experiment. Five kingdom classification of R.H. Whittaker
- 2. Discovery of microorganisms, Pasteur experiments, germ theory of diseases.
- 3. Shape and symmetry of viruses; structure of TMV and Gemini virus; multiplication of TMV; A brief account of Prions and Viroids.
- 4. A general account on symptoms of plant diseases caused by Viruses. Transmission of plant viruses and their control.
- 5. Significance of viruses in vaccine production, bio-pesticides and as cloning vectors.

UNIT – II: SPECIAL GROUPS OF BACTERIAANDEUBACTERIA 12 Hrs.

- 1. Brief account of Archaebacteria, Actinomycetes and Cyanobacteria.
- 2. Cell structure and nutrition of Eubacteria.

- 3. Reproduction- Asexual (Binary fission and endospores) and bacterial recombination (Conjugation, Transformation, Transduction).
- 4. Economic importance of Bacteria with reference to their role in Agriculture and industry (fermentation and medicine).
- A general account on symptoms of plant diseases caused by Bacteria; Citruscanker. UNIT – 3: FUNGI&LICHENS 12 Hrs.
- 1. General characteristics of fungi and Ainsworth classification (uptoclasses).
- 2. Structure, reproduction and life history of (a) Rhizopus (Zygomycota) and (b) Puccinia (Basidiomycota).
- 3. Economic uses of fungi in food industry, pharmacy and agriculture.
- 4. A general account on symptoms of plant diseases caused by Fungi; Blast ofRice.
- 5. Lichens- structure and reproduction; ecological and economicimportance.

UNIT –4:ALGAE 12 Hrs.

- 1. General characteristics of Algae (pigments, flagella and reserve food material); Fritsch classification (uptoclasses).
- 2. Thallus organization and life cycles inAlgae.
- Occurrence, structure, reproduction and life cycle of (a) Spirogyra (Chlorophyceae)and (b) Polysiphonia (Rhodophyceae).
- 4. Economic importance of Algae.

UNIT -5:BRYOPHYTES 12 Hrs.

- 1. General characteristics of Bryophytes; classification uptoclasses.
- 2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life cycle of (a) Marchantia (Hepaticopsida) and (b)Funaria(Bryopsida).

General account on evolution of sporophytes inBryophyta

SEMESTER-2

P-II: BASICS OF VASCULAR PLANTS AND PHYTOGEOGRAPHY

COURSE OUTCOMES

CO1: Diversified plant groups in vascular plants CO2: Deals with flowering seeded classification & Nomenclature CO3:complete knowledge about important families like ASTERACEAE & POACEAE CO4: Create knowledge about the plant groups & ecotypes CO5: The students will understand about the phytogeographical zones

Learning Outcomes: On Completion of the course, the students will be able to	Knowledge level (Bloom's Taxonomy)	Average level weightage
CO1: Diversified plant groups in vascular	Level1(Knowledge)	
plants	Level2(Understanding)	1.5
CO2: Deals with flowering seeded	Level1(Knowledge)	
classification and Nomen clture	Level2(Understanding)	2
	Level3(Application)	
CO3:Create knowledge about important	Level1(Knowledge)	2
families like ASTERACEAE&POACEAE	Level2(Understanding)	
	Level3(Application)	
CO4: Create knowledge about the plant	Level3(Application)	4
groups& eco types	Level4(Analysing)	
	Level5(Evaluation)	
CO5: The students will understand	Level 2(Understanding)	3.5
about the phytogeographical zones	Level 3(Applying)	
	Level 4(Analysing)	
	Level 5(Evaluation)	

1-Low, 2-Moderate, 3-High, '-' No Correlation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	0	1	1	1	2	1	1	3
CO2	0	1	1	0	1	2	1	2	1
CO3	1	1	0	2	2	0	0	1	2
CO4	1	1	2	1	1	2	1	1	2
CO5	3	2	2	2	2	2	3	2	2

CO-PSO Mapping

1-Low, 2-Moderate, 3-High, '-' No Correlation

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	1	2	2	1
CO2	1	2	1	2	2	1
CO3	2	1	1	2	1	1
CO4	1	1	1	2	2	1
CO5	2	1	1	1	1	3

ATTAI	NMENT	OF POs
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	PROGRAM OUTCOMES ATTAINMENT										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9		
CO 1	5.42857 1	0	2.714286	2.714286	2.71428 6	5.428571	2.714286	2.714286	8.142857		
CO2	0	2.619048	2.619048	0	2.61904 8	5.238095	2.619048	5.238095	2.619048		
CO3	2.61904 8	2.619048	0	5.238095	5.23809 5	0	0	2.619048	5.238095		
CO4	2.23809 5	2.238095	4.47619	2.238095	2.23809 5	4.47619	2.238095	2.238095	4.47619		
CO 5	7	4.666667	4.666667	4.666667	4.66666 7	4.666667	7	4.666667	4.666667		
FINAL ATTAI NMEN T	2.46938 8	2.428571	2.412698	2.47619	2.49659 9	2.47619	2.428571	2.496599	2.514286		

PROGRAM SPECIFIC OUTCOMES ATTAINMENT									
	PSO1	PSO2	PSO3	PSO4	PSO5				
CO 1	8.142857	5.428571	2.714286	5.428571	5.428571				
CO2	2.619048	5.238095	2.619048	5.238095	5.238095				
CO3	5.238095	2.619048	2.619048	5.238095	2.619048				
CO4	2.238095	2.238095	2.238095	4.47619	4.47619				
CO 5	4.666667	2.333333	2.333333	2.333333	2.333333				
FINAL ATTAINMENT	2.544974	2.55102	2.504762	2.52381	2.511905				

I B.Sc., -Botany-II/ II Semester BASICS OF VASCULAR PLANTS AND PHYTOGEOGRAPHY

UNIT –I: PTERIDOPHYTES

- 1. General characteristics of Pteridophyta; classification of Smith (1955) uptodivisions.
- 2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life history of (a) Lycopodium (Lycopsida) and (b) Marsilea(Filicopsida).
- 3. Stelar evolution inPteridophytes;
- 4. Heterospory and seedhabit.

UNIT -II:GYMNOSPERMS

- 1. General characteristics of Gymnosperms; Sporne classification upto classes.
- 2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life history of (a) Cycas (Cycadopsida) and (b) Gnetum(Gnetopsida).
- 3. Outlines of geological timescale.
- 4. A brief account onCycadeoidea.

UNIT – III: BASIC ASPECTSOFTAXONOMY

- 1. Aim and scope of taxonomy; Species concept: Taxonomic hierarchy, species, genusand family.
- 2. Plant nomenclature: Binomial system, ICBN- rules fornomenclature.
- 3. Herbarium and its techniques, BSI herbarium and Kew herbarium; concept of digital herbaria.
- 4. Bentham and Hooker system of classification;
- 5. Systematic description and economic importance of the followingfamilies:
 - (a) Annonaceae (b)Curcurbitaceae

UNIT – IV:SYSTEMATICTAXONOMY

- 1. Systematic description and economic importance of the followingfamilies:
 - (a) Asteraceae (b) Asclepiadaceae (c) Amaranthaceae (d)Euphorbiaceae
 - (e) Arecaceae and (f) Poaceae
- 2. Outlines of Angiosperm Phylogeny Group (APGIV).

UNIT -V:PHYTOGEOGRAPHY

- 1. Principles of Phytogeography, Distribution (wides, endemic, discontinuousspecies)
- 2. Endemism types and causes.
- 3. Phytogeographic regions of World.
- 4. Phytogeographic regions ofIndia.
- 5. Vegetation types in AndhraPradesh.

SEMESTER-3

Paper-III : Plant Taxonomy and Embryology

CO1: Fundamental components of taxonomical study CO2: Nomenclature of flowering plants and their distribution

CO3: Complete knowledge about important families like Cucurbitaceae, Rutaceae, etc.

CO4: Total awareness gained from plant embryology

Co5: they analyse the differences between momcots and Monoclamydae

LearningOutcomes:On Completion of thecourse, the students will be able to	Knowledge level (Bloom's Taxonomy)	Average level weightage
CO1: fundamental components of	Level1(Knowledge)	2
taxonomical study	Level2(Understanding)	
	Level3(Application)	
CO2: Nomenclature of flowering plants and	Level1(Knowledge)	1.5
their distribution	Level2(Understanding)	
CO3: Complete knowledge about	Level1(Knowledge)	2
Cucurbitaceae, Rutaceae, etc	Level2(Understanding)	
	Level3(Application)	
CO4: Total awareness gained from plant	Level2(Understanding)	3.5
embryology	Level3(Application)	
	Level4(Analysing)	
	Level5(Evaluation)	
Co5: They analyse the	Level2(Understanding)	3.5
differences between monocots and Monoclamydae	Level3(Applying)	
	Level4(Analysing)	
	Level5(Evaluation)	

1-Low, 2-Moderate, 3-High, '-' No Correlation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	0	1	1	1	2	1	1	3
CO2	1	0	1	0	1	2	1	2	1
CO3	1	1	0	2	2	0	1	0	2
CO4	1	1	0	1	0	2	1	1	2
CO5	3	2	2	2	2	2	3	2	2

CO-PSO Mapping

1-Low, 2-Moderate, 3-High, '-' No Correlation

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	1	2	1	1
CO2	1	3	1	2	1	1
CO3	1	2	1	3	1	1
CO4	1	1	2	2	1	1
CO5	2	1	1	1	1	3

ATTAINME	INT OF POs
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	PROGRAM OUTCOMES ATTAINMENT											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9			
CO 1	5.34204 1	0	2.67102	2.67102	2.67102	5.342041	2.67102	2.67102	8.013061			
CO2	2.75326 5	0	2.753265	0	2.75326 5	5.506531	2.753265	5.506531	2.753265			
CO3	2.67102	2.67102	0	5.342041	5.34204 1	0	2.67102	0	5.342041			
CO4	2.42428 6	2.424286	0	2.424286	0	4.848571	2.424286	2.424286	4.848571			
CO 5	7.27285 7	4.848571	4.848571	4.848571	4.84857 1	4.848571	7.272857	4.848571	4.848571			
FINAL ATTAI NMEN T	2.55793 4	2.485969	2.568214	2.547653	2.60248 3	2.568214	2.541778	2.575068	2.580551			

PROGRAM SPECIFIC OUTCOMES ATTAINMENT									
	PSO1	PSO2	PSO3	PSO4	PSO5				
CO 1	8.013061	8.013061	2.67102	5.342041	2.67102				
CO2	2.753265	8.259796	2.753265	5.506531	2.753265				
CO3	2.67102	5.342041	2.67102	8.013061	2.67102				
CO4	2.424286	2.424286	4.848571	4.848571	2.424286				
CO 5	4.848571	2.424286	2.424286	2.424286	2.424286				
FINAL ATTAINMENT	2.588776	2.646347	2.561361	2.613449	2.588776				

II B. Sc - SEMESTER –III: BOTANY THEORY PAPER – III Paper-III : Plant Taxonomy and Embryology

UNIT - I: INTRODUCTION TO PLANT TAXONOMY

1. Fundamental components of taxonomy (identification, nomenclature, classification)

- 2. Taxonomic resources: Herbarium- functions& importantherbaria, Botanical gardens, Flora, Keys- single access andmulti-access.
- 3.Botanical Nomenclature- Principles and rules of ICBN (ranks and names; principleof priority, binomial system; type method, author citation, valid-publication).

UNIT –II: CLASSIFICATION

1. Types of classification- Artificial, Natural and Phylogenetic.

- 2. Bentham & Hooker's system of classification- merits and demerits.
- 3. Engler&Prantle's system of classification- merits anddemerits
- 4. Phylogeny origin and evolution of Angiosperms

UNIT –III: SYSTEMATIC TAXONOMY-I

1. Systematic study and economic importance of the following families: Annonaceae, Brassicaceae, Rutaceae, Curcurbitaceae, and Apiaceae.

UNIT -IV:SYSTEMATIC TAXONOMY-II

1. Systematic study and economic importance of plants belonging to the following families: Asteraceae, Asclepiadaceae, Lamiaceae, Ephorbiaceae, Arecaceae, and Poaceae.

UNIT -V:EMBRYOLOGY

- 1. Anther structure, microsporogenesis and development of malegametophyte.
- 2. Ovule structure and types; Megasporogenesis, development of Monosporic
- 3. Bisporicand Tetrasporic types (*Peperomia*, *Drusa*, *Adoxa*) of embryosacs.
- 4. Pollination and Fertilization (out lines) Endosperm development and types.
- 5. Development of Dicot and Monocot embryos, Polyembryony.

SEMESTER – 4 Paper-IV: Plant Physiology and Metabolism

CO1: Knowledge about the metabolism of plant

CO2: The students can understand about

the mechanism of absorption of water in

plants

CO3: aware with the mechanism of photosynthesis, respiration in plants

CO4: knowledge developed about phytoharmonal regulations and photo periodism

CO5: The students can differentiate CO2 fixation in C3& C4 cycles

Learning Outcomes: On Completion of the course, the students will be able to	Knowledge level (Bloom's Taxonomy)	Average level weightage
CO1: knowledge about the	Level1(Knowledge)	1.5
metabolism of plant	Level2(Understanding)	
CO2: The students can	Level1(Knowledge)	1.5
understand about the	Level2(Understanding)	
mechanism of absorption of		
water in plants		
CO3: aware with the mechanism of	Level1(Knowledge)	2.5
photosynthesis, respiration in plants	Level2(Understanding)	
	Level3(Application) Level4(Analysing)	
CO4: knowledge developed about phyto-	Level3(Application)	4
harmonal regulations and photo	Level4(Analysing)	
periodism	Level5(Evaluation)	
CO5: The students can	Level2(Understanding)	3.5
differentiate CO2 fixation in C3 & C4 cycles	Level3(Applying)	
	Level4(Analysing)	
	Level5(Evaluation)	

1-Low, 2-Moderate, 3-High, '- 'NoCorrelation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	0	1	1	1	2	1	1	3
CO2	1	0	1	0	0	2	1	2	1
CO3	1	1	0	2	2	0	0	0	2
CO4	1	1	0	1	0	2	1	1	2
CO5	3	2	2	2	2	2	3	2	2

CO-PSO Mapping

1-Low, 2-Moderate, 3-High, '-'NoCorrelation

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	1	2	2	1
CO2	1	2	1	2	2	1
CO3	2	1	1	3	1	1
CO4	1	1	1	2	3	1
CO5	2	1	1	1	1	3

ATTAINMENT OF POs

	PROGRAM OUTCOMES ATTAINMENT										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9		
CO 1	5.74285 7	0	2.871429	2.871429	2.87142 9	5.742857	2.871429	2.871429	8.614286		
CO2	2.87142 9	0	2.871429	0	0	5.742857	2.871429	5.742857	2.871429		
соз	2.78571 4	2.785714	0	5.571429	5.57142 9	0	0	0	5.571429		
CO4	2.65714 3	2.657143	0	2.657143	0	5.314286	2.657143	2.657143	5.314286		
CO 5											
	8.1	5.4	5.4	5.4	5.4	5.4	8.1	5.4	5.4		
INAL											
IMEN	2.76964				2.76857						
Т	3	2.710714	2.785714	2.75	1	2.775	2.75	2.778571	2.777143		

PROGRAM SPECIFIC OUTCOMES ATTAINMENT									
	PSO1	PSO2	PSO3	PSO4	PSO5				
CO 1	5.742857	8.614286	2.871429	5.742857	5.742857				
CO2	2.871429	5.742857	2.871429	5.742857	5.742857				
CO3	5.571429	2.785714	2.785714	8.357143	2.785714				
CO4	2.657143	2.657143	2.657143	5.314286	7.971429				
CO 5	5.4	2.7	2.7	2.7	2.7				
FINAL ATTAINMENT	2.780357	2.8125	2.777143	2.785714	2.771429				

II B.Sc. BOTANY, SEMESTER- IV, Paper-IV: THEORY : PLANT PHYSIOLOGY AND METABOLISM

UNIT – I: Plant – Water relations

- 1. Physical properties of water, Importance of water to plant life.
- 2. Diffusion, imbibition and osmosis; concept & components of Waterpotential.
- 3. Absorption and transport of water and ascent ofsap.
- 4. Transpiration –Definition, types of transpiration, structure and opening and closing mechanism of stomata.

UNIT -II: Mineral nutrition&Enzymes

- 1. Mineral Nutrition: Essential elements (macro and micronutrients) and their rolein plant metabolism, deficiencysymptoms.
- 2. Mineral ion uptake (active and passivetransport).
- 3. Nitrogen metabolism- biological nitrogen fixation in *Rhizobium*, outlines of protein synthesis (transcription and translation).
- 4. Enzymes: General characteristics, mechanism of enzyme actionand factors regulating enzymeaction.

UNIT-III:PHOTOSYNTHESIS

- 1. Photosynthesis: Photosynthetic pigments, photosynthetic light reactions, photo- phosphorylation, carbon assimilation pathways: C3, C4, and CAM (briefaccount)
- 2. Photorespiration and itssignificance.
- 3. Translocation of organic solutes: mechanism of phloem transport, source- sinkrelationships.

UNIT - IV:RESPERATION&LIPIDMETABOLISM

- 1. Respiration: Glycolysis, anaerobic respiration, TCA cycle, electrontransport system. Mechanism of oxidative phosphorylation.
- 2. Lipid Metabolism: Types of lipids, Beta-oxidation.

UNIT -V: GROWTH AND DEVELOPMENT

- 1. Growth and development: definition, phases and kinetics of growth.
- 2. Physiological effects of phytohormones Auxins, Gibberellins,Cytokinins, ABA, Ethylene andBrassinosteroids
- 3. Physiology of flowering -photoperiodism, role of phytochromein flowering; Vernalization.
- 4. Physiology of Scenescence and Ageing.

SEMESTER -5 Paper-V: Cell Biology, Genetics and Plant Breeding

CO1: detailed study about ultra-structure of cell is possible

- CO2: thestudent will understand the structure of DNA &RNA
- CO3: detailed study about ultra-structure of cell is possible

CO4: plant genome study in structural and functional aspect is possible

Co5: the students can analyse the significance of mutations in molecular breeding

LearningOutcomes:OnCompletionofthe course, the students will be able to	Knowledgelevel(Bloom's Taxonomy)	Average level weightage
CO1: Detailed study about ultra-	Level1(Knowledge)	1.5
	Level2(Understanding)	
CO2: the student will understand	Level1(Knowledge)	2.3
the structure of DNA & RNA	Level2(Understanding)	
	Level4(Analysing)	
structure of cell is possible	Level1(Knowledge)	2
_	Level2(Understanding)	
	Level3(Application)	
CO4: plant genome study in structural and functional aspect is	Level3(Application)	4
possible	Level4(Analysing)	
	Level5(Evaluation)	
Co5: the students can analyse the	Level2(Understanding)	3.5
significance of mutations in molecular	Level3(Applying)	
breeding	Level4(Analysing)	
	Level5(Evaluation)	

1-Low, 2-Moderate, 3-High, '-'NoCorrelation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	0	1	1	1	2	1	1	3
CO2	1	1	0	0	0	2	1	2	1
CO3	1	1	0	2	2	1	0	0	2
CO4	1	1	0	1	1	2	1	0	2
CO5	3	2	2	2	2	2	3	2	2

CO-PSO Mapping

1-Low, 2-Moderate, 3-High, '-' No Correlation

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	1	2	2	1
CO2	1	2	1	2	1	1
CO3	2	1	1	3	1	1
CO4	1	1	1	2	1	1
CO5	2	1	1	1	2	3

ATTAINMENT OF POs

	PROGRAM OUTCOMES ATTAINMENT											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9			
CO 1	6	0	3	3	3	6	3	3	9			
CO2	3	3	0	0	0	6	3	6	3			
CO3	3	3	0	6	6	3	0	0	6			
CO4	3	3	0	3	3	6	3	0	6			
CO 5	9	6	6	6	6	6	9	6	6			
FINAL ATTAI NMEN T	3	3	3	3	3	3	3	3	3			

PROGRAM SPECIFIC OUTCOMES ATTAINMENT									
	PSO1	PSO2	PSO3	PSO4	PSO5				
CO 1	6	9	3	6	6				
CO2	3	6	3	6	3				
CO3	6	3	3	9	3				
CO4	3	3	3	6	3				
CO 5	6	3	3	3	6				
FINAL ATTAINMENT	3	3	3	3	3				

III B. Sc - SEMESTER- V: Paper-V: Cell Biology, Genetics and Plant Breeding

UNIT – I Cell Biology:

- 1. Cell, the unit of life- Cell theory, Prokaryotic and eukaryotic cells; Eukaryotic cellcomponents.
- 2. Ultra structure and functions of cell wall and cellmembranes.
- 3. Chromosomes: morphology, organization of DNA in achromosome (nucleosome model), Euchromatin and heterochromatin.

UNIT – II Genetic Material:

DNA as the genetic material: Griffith's and Avery'stransformation experiment,

Hershey - Chase bacteriophageexperiment.

1. DNA structure (Watson & Crick model) and replication of DNA(semi-conservative)

2. Different forms of DNA (A-DNA, B-DNA, Z-DNA)

3. Types of RNA (mRNA, tRNA, rRNA), their structure and function.

UNIT – III Mendelian Inheritance:

- 1. Mendel's laws of Inheritance (Mono- and Di- hybrid crosses); backcrossand testcross.
- 2. Chromosome theory of Inheritance.
- 3.Linkage: concept, complete and incomplete linkage, coupling and repulsion; linkage mapsbased on two and three factorcrosses.

4. Crossing Over: concept & significance.

UNIT – IV Plant Breeding:

- 1. Introduction and Objectives of plantbreeding.
- 2. Methods of crop improvement: Procedure, advantages and limitations of Introduction, Selection, and Hybridization (outlinesonly).

UNIT – V Breeding, Crop ImprovementandBiotechnology:

- 1. Role of mutations in cropimprovement.
- 2. Role of somaclonal variations in cropimprovement.
- 3. Molecular breeding use of DNA markers in plant breeding and cropimprovement (RAPD, RFLP).

SEMESTER-V,

PAPER-VI: PLANT ECOLOGY& PHYTOGEOGRAPHY

CO1: knowledge created about ecological plant species, ecotypes CO2: awareness created about geographical distribution of plant species

CO3 : Analyse the bio geo chemical cycles.

Co4 They can learn about the concepts of population ecology

Co5: they can understand about the bio diversity conservation methods

Learning Outcomes: On Completion of the course, the students will be able to	Knowledge level (Bloom's Taxonomy)	Average level weightage
CO1: knowledge created about ecological plant species, ecotypes	Level1(Knowledge) Level2(Understanding)	1.5
CO2: awareness created about thy geographical distribution	Level1(Knowledge) Level2(Understanding)	1.5
CO3 :Analyse the bio geo chemical cycles	Level1(Knowledge) Level2(Understanding) Level3(Application)	2
CO4: They can learn about the concepts of population ecology	Level2(Understanding) Level3(Application) Level4(Analysing) Level5(Evaluation)	3.5
Co5: they can understand about the bio diversity conservation methods	Level2(Understanding) Level3(Applying) Level4(Analysing) Level5(Evaluation)	3.5

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1-Low, 2-Moderate, 3-High, '-' No Correlation										
4.										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	
CO1	2	0	1	1	1	2	1	1	3	
CO2	1	0	1	0	0	2	1	2	1	

CO3

CO4

CO5

CO-PSO Mapping

1-Low, 2-Moderate, 3-High, '-'NoCorrelation

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	1	2	2	1
CO2	1	2	1	1	1	2
CO3	2	1	1	3	1	1
CO4	1	1	1	2	1	1
CO5	2	1	1	1	1	3

ATTA	INME	NT OF	POs
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	PROGRAM OUTCOMES ATTAINMENT												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9				
CO 1	6	0	3	3	3	6	3	3	9				
CO2	3	0	3	0	0	6	3	6	3				
CO3	3	3	0	6	6	0	3	0	6				
CO4	3	3	6	3	6	6	3	3	6				
CO 5	9	6	6	6	6	6	9	6	6				
FINAL ATTAI NMEN T	3	3	3	3	3	3	3	3	3				

PROGRAM SPECIFIC OUTCOMES ATTAINMENT										
	PSO1	PSO2	PSO3	PSO4	PSO5					
CO 1	6	9	3	6	6					
CO2	3	6	3	3	3					
CO3	6	3	3	9	3					
CO4	3	3	3	6	3					
CO 5	6	3	3	3	3					
FINAL ATTAINMENT	3	3	3	3	3					

III B. Sc - SEMESTER- V: BOTANY THEORY SYLLABUS PAPER-VI: PLANT ECOLOGY& PHYTOGEOGRAPY

UNIT – I. Elements of Ecology

Climatic Factors: Light, Temperature, precipitation.

- 1. Edaphic Factor: Origin, formation, composition and soil profile.
- 2. Biotic Factor: Interactions between plants and animals.

UNIT- II.Ecosystem Ecology

- 1. Ecosystem: Concept and components, energy flow, Food chain, Food web, Ecologicalpyramids.
- 2. Productivity of ecosystem-Primary, Secondary and Net productivity.
- 3. Biogeochemical cycles- Carbon, Nitrogen and Phosphorous.

UNIT – II Population & Community Ecology

- 1. Population -definition, characteristics and importance, outlines-ecotypes.
- 2. Plant communities- characters of a community, outlines Frequency, density, cover, life forms, competition.
- 3. Interaction between plants growing in acommunity.

UNIT – IV Phytogeography

Principles of Phytogeography, Distribution (wides, endemic, discontinuousspecies)

- 1. Phytogeographic regions ofIndia.
- 2. Phytogeographic regions of World.
- 3. Endemism types and causes

UNIT- V: Plant Biodiversity and its importance

- 1. Definition, levels of biodiversity-genetic, species and ecosystem.
- 2. Biodiversity hotspots- Criteria, Biodiversity hotspots ofIndia.
- 3. Loss of biodiversity causes and conservation (*In-situ* and *ex-situ*methods).
- 4. Seed banks conservation of genetic resources and theirimpor

SEMESTER - 6 SEMESTER- VI PAPER

Paper VII-(B): Nursery, Gardening and Floriculture.

CO1: students understand different vegetative propagagtive methods

CO2: they develop skill towards floriculture

CO3: they learn about Nursery management

methods

CO4: Ornamental plants study is possible

CO5: different landscapeing methods

Learning Outcomes: On Completion of thecourse, the students will be able to	Knowledge level (Bloom's Taxonomy)	Average level weightage
CO1: students understand different vegetative propagagtive methods	Level1(Knowledge) Level2(Understanding)	1.5
CO2: they develop skill towards floriculture	Level1(Knowledge) Level2(Understanding) Level3(Application)	2
CO3 : they learn about Nursery management methods	Level1(Knowledge) Level2(Understanding) Level3(Application)	2
CO4 : Ornamental plants study is possible	Level3(Application) Level4(Analysing) Level5(Evaluation)	4
CO5: : Different landscapeing methods	Level2(Understanding) Level3(Applying) Level4(Analysing) Level5(Evaluation)	3.5

CO-PO Mapping							
	1-Low, 2-Moderate, 3-High,	'_'	NoCorrelation				

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	0	1	1	1	2	1	1	3
CO2	0	1	0	1	0	2	1	2	1
CO3	1	1	1	2	2	1	0	1	2
CO4	1	1	0	1	1	2	1	0	2
CO5	3	2	2	2	2	2	3	2	2

1-Low, 2-Moderate, 3-High, '-' No Correlation

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	1	2	2	1
CO2	1	2	1	1	1	1
CO3	2	2	1	2	2	1
CO4	1	1	1	2	1	1
CO5	1	1	1	1	1	3

	PROGRAM OUTCOMES ATTAINMENT											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9			
CO 1	5.65210 1	0	2.82605	2.82605	2.82605	5.652101	2.82605	2.82605	8.478151			
CO2	0	2.768067	0	2.768067	0	5.536134	2.768067	5.536134	2.768067			
CO3	2.76806 7	2.768067	2.768067	5.536134	5.53613 4	2.768067	0	2.768067	5.536134			
CO4	2.53613 4	2.536134	0	2.536134	2.53613 4	5.072269	2.536134	0	5.072269			
CO 5	7.78235 3	5.188235	5.188235	5.188235	5.18823 5	5.188235	7.782353	5.188235	5.188235			
FINAL ATTAI NMEN T	2.67695 1	2.652101	2.695588	2.693517	2.68109 2	2.690756	2.652101	2.719748	2.704286			

ATTAINMENT OF POs

PROGRAM SPECIFIC OUTCOMES ATTAINMENT										
	PSO1	PSO2	PSO3	PSO4	PSO5					
CO 1	5.652101	8.478151	2.82605	5.652101	5.652101					
CO2	2.768067	5.536134	2.768067	2.768067	2.768067					
CO3	5.536134	5.536134	2.768067	5.536134	5.536134					
CO4	2.536134	2.536134	2.536134	5.072269	2.536134					
CO 5	2.594118	2.594118	2.594118	2.594118	2.594118					
FINAL ATTAINMENT	2.726651	2.742297	2.698487	2.702836	2.726651					

B. Sc - BOTANY SYLLABUS SEMESTER- VI PAPER – VII – ELECTIVE

Paper VII-(B): Nursery, Gardening and Floriculture.

UnitI: Nursery:

Definition, objectives, scope and building up of infrastructure for nursery.

1. Planning and seasonal activities - Planting - direct seeding andtransplants.

2. Nursery Management and Routine GardenOperations.

UnitIII:Gardening

- 1. Definition, objectives and scope different types ofgardening.
- 2. Landscape and home gardening parks and its components, plantmaterials and design.Computer applications inlandscaping and design.
- 3. Gardening operations: soil laying, manuring, watering.
- 4. Landscaping Places of Public Importance: Landscaping highways and Educational Institutions)
- 5. Some Famous gardens of India.

Unit III: Propagation methods

seedlings, transplanting of seedlings.

layering, cutting, selection of cutting ,propagule collecting season,

cutting rooting medium and planting of cuttings - Hardeningofplants.

Propagation of ornamental plants by rhizomes, corms tubers, bulbs and bulbils.

Green house - mist chamber, shed root, shade house and glasshouse for

Propagation

UnitIV:Floriculture:

1. Ornamental Plants: Flowering annuals; herbaceous, perennials; Divinevines; Shade and ornamentaltrees.

2. Ornamental bulbous and foliage plants; Cacti and succulents.

- 3. Ornamentals-palms.
- 4. Cultivation of plants in pots; Indoor gardening; Bonsai.

Unit V:Commercial Floriculture

1. Factors affecting flower production; Production and packaging of cut flowers; Flower arrangements; Methods to prolong vase life of flowers

3. Cultivation of Important cut flowers (Carnation, Aster, Dahlia,

Gerbera, Anthuriams, Gladiolous, Marigold, Rose, Lilium)

4. Management of pests, diseases and harvesting.

III B.Sc.: BOTANY SYLLABUS SEMESTER- VI

Paper VIII, CLUSTER ELECTIVE, Cluster-A, Paper VIII-A-1 : PLANT DIVERSITY AND HUMAN WELFARE

CO1:understand the significance of plants in human welfare

CO2: learn about bio diversity conservation

Co3:Anlyse the commercial importance of wood

Co4 understad the sustainable methods and their significance

Co5: Anlyse the concept of ecological foot print

Learning Outcomes: On Completion of the course, the students will be able to	Knowledge level (Bloom's Taxonomy)	Average level weightage
CO1: understand the significance of	Level1(Knowledge)	1.5
plants in human welfare	Level2(Understanding)	
CO2: learn about bio diversity conservation	Level1(Knowledge) Level2(Understanding) Level4(Analysing)	2.3
CO3 : Anlyse the commercial importance of wood	Level1(Knowledge) Level2(Understanding) Level3(Application)	2
Co4 : understand the sustainable methods and their significance	Level2(Understanding) Level3(Application) Level4(Analysing) Level5(Evaluation)	3.5
Co5: Anlyse the concept of ecological foot print	Level2(Understanding) Level3(Applying) Level4(Analysing)	3.5
	Level5(Evaluation)	

1-Low, 2-Moderate, 3-High, '-' No Correlation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	0	1	1	1	2	1	1	3
CO2	1	0	0	0	1	2	1	2	1
CO3	1	1	0	2	2	1	0	0	2
CO4	1	1	0	1	0	2	1	0	2
CO5	3	2	2	2	2	2	3	2	2

CO-PSO Mapping

1-Low, 2-Moderate, 3-High, '-' No Correlation

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	1	2	2	1
CO2	1	2	1	2	1	1
CO3	2	2	1	3	1	1
CO4	1	1	1	2	1	1
CO5	2	1	1	1	1	3

ATTAINMENT OF POs

	PROGRAM OUTCOMES ATTAINMENT										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9		
CO 1	5.66294 3	0	2.831472	2.831472	2.83147 2	5.662943	2.831472	2.831472	8.494415		
CO2	2.74159	0	0	0	2.74159	5.483179	2.74159	5.483179	2.74159		
CO3	2.77529 5	2.775295	0	5.550591	5.55059 1	2.775295	0	0	5.550591		
CO4	2.60676 7	2.606767	0	2.606767	0	5.213534	2.606767	0	5.213534		
CO 5	7.82030 1	5.213534	5.213534	5.213534	5.21353 4	5.213534	7.820301	5.213534	5.213534		
INAL ATTAI IMEN T	2.70086 2	2.648899	2.681668	2.700394	2.72286 4	2.705387	2.666688	2.705637	2.721366		

PROGRAM SPECIFIC OUTCOMES ATTAINMENT										
	PSO1	PSO2	PSO3	PSO4	PSO5					
CO 1	8.494415	8.494415	2.831472	5.662943	5.662943					
CO2	2.74159	5.483179	2.74159	5.483179	2.74159					
CO3	5.550591	5.550591	2.775295	8.325886	2.775295					
CO4	2.606767	2.606767	2.606767	5.213534	2.606767					
CO 5	5.213534	2.606767	2.606767	2.606767	2.606767					
FINAL ATTAINMENT	2.7341	2.74908	2.712378	2.729231	2.732227					

CLUSTERELECTIVES III B.Sc.: BOTANY SYLLABUS SEMESTER- VI Paper VIII, CLUSTER ELECTIVE, Cluster-A, Paper VIII-A-1 : PLANT DIVERSITY AND HUMAN WELFARE

Unit- I: Plant diversity and its scope:

i. Genetic diversity, Species diversity, Plant diversity at the level ecosystem Agro biodiversity and cultivated plant taxa, wildtaxa.

a) Values and uses of biodiversity: Ethical andaesthetic

ii. values, Methodologies for valuation, Uses ofplants.

Unit -II: Loss of biodiversity:

i. Loss of genetic diversity, Loss of species diversity, Loss of ecosystem diversity, Loss of agro biodiversity, projected scenario for biodiversity loss

ii. Management of plant biodiversity: Organizations associated withbiodiversity management-Methodology for execution-IUCN, UNEP, UNESCO, WWF, NBPGR;

Biodiversity legislation and conservations, Biodiversity information management and communication.

Unit-III: Contemporary practices inresource management:

i. Environmental Impact Assessment (EIA), GeographicalInformation System GIS, Participatory resourceappraisal, Ecologicalfootprint with emphasis on carbonfootprint,Resourceaccounting;

ii. Solid and liquid wastemanagement

Unit -IV: Conservation ofbiodiversity

i. Conservation of genetic diversity, species diversity and ecosystem diversity, *In situ* and *ex situ*conservation,

ii. Social approaches to conservation, Biodiversity awareness programmes, Sustainabledevelopment.

Unit- V: Role of plants in relation toHuman Welfare

Importance of forestry, their utilization and commercialaspects-

a)Avenue trees, b) ornamental plants of India.

c) Alcoholicbeverages through ages.

i. Fruits and nuts: Important fruit crops their commercial importance. Wood, fiber and their uses.

III B. Sc - BOTANY SYLLABUS SEMESTER- VI VIII : CLUSTER ELECTIVE –A2

Paper VIII-A-2 : ETHNOBOTANY AND MEDICINAL BOTANY

CO1:understand the significance of Medicinal plants

CO2: learn about the concepts of Ayurveda sidda traditional medicinal practice systems

Co3:understand about different medicinal plants and their significance

Co4 : understand the conept of Ttraditional knowledge and IPR

Co5: Analyse the importance of botanical garden in bio diversity conservation

Learning Outcomes: On Completion of the course, the students will be able to	Knowledge level (Bloom's Taxonomy)	Average level weightage
CO1: understand the significance of	Level1(Knowledge)	1.5
Medicinal plants	Level2(Understanding)	
CO2: learn about the	Level1(Knowledge)	2
concepts of Ayurveda	Level2(Understanding)	
sidda	Level3(Application)	
CO3 : traditional medicinal practice	Level1(Knowledge)	2
systems	Level2(Understanding)	
	Level3(Application)	
Co4 : understand the conept of	Level3(Application)	4
Ttraditional knowledge and IPR	Level4(Analysing)	
	Level5(Evaluation)	
Co5: Analyse the importance of	Level2(Understanding)	3.5
botanical garden in bio diversity conservation	Level3(Applying)	
	Level4(Analysing)	
	Level5(Evaluation)	

1-Low, 2-Moderate, 3-High, '-' No Correlation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	1	1	1	0	2	1	1	3
CO2	0	0	1	0	1	2	1	2	1
CO3	1	1	0	2	2	0	1	0	2
CO4	1	1	0	1	0	2	1	0	2
CO5	3	2	2	2	2	2	3	2	2

CO-PSO Mapping

1-Low, 2-Moderate, 3-High, '-' No Correlation

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	1	2	2	1
CO2	1	2	1	2	2	1
CO3	2	1	1	2	1	1
CO4	1	1	1	2	1	1
CO5	2	1	1	1	1	3

	PROGRAM OUTCOMES ATTAINMENT											
PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8									PO8	PO9		
со	1	5.70225 6	2.851128	2.851128	2.851128	0	5.702256	2.851128	2.851128	8.553383		
со)2	0	0	2.801504	0	2.80150 4	5.603008	2.801504	5.603008	2.801504		
со	3	2.80150 4	2.801504	0	5.603008	5.60300 8	0	2.801504	0	5.603008		
co	4	2.60300 8	2.603008	0	2.603008	0	5.206015	2.603008	0	5.206015		
со	5	7.95789 5	5.305263	5.305263	5.305263	5.30526 3	5.305263	7.957895	5.305263	5.305263		
IN/ \TT IMI T	AL AI EN	2.72352 3	2.71218	2.739474	2.727068	2.74195 5	2.727068	2.716434	2.75188	2.746917		

ATTAINMENT OF POs

PROGRA	PROGRAM SPECIFIC OUTCOMES ATTAINMENT									
	PSO1	PSO2	PSO3	PSO4	PSO5					
CO 1	8.553383	5.702256	2.851128	5.702256	5.702256					
CO2	2.801504	5.603008	2.801504	5.603008	5.603008					
CO3	5.603008	2.801504	2.801504	5.603008	2.801504					
CO4	2.603008	2.603008	2.603008	5.206015	2.603008					
CO 5	5.305263	2.652632	2.652632	2.652632	2.652632					
FINAL ATTAINMENT	2.762907	2.766058	2.741955	2.75188	2.766058					

III B. Sc - BOTANY SYLLABUS SEMESTER-VIII : CLUSTER ELECTIVE –A2

Paper VIII-A-2 : ETHNOBOTANY AND MEDICINAL BOTANY Unit –I:Ethnobotany

- i. Introduction, concept, scope and objectives; Ethnobotany as an interdisciplinary science. The relevance of ethnobotany in the present context
- ii. Major and minor ethnic groups or Tribals of India, and their lifestyles.
- iii. Plants used by the tribal populations: a) Food plants, b) intoxicants and beverages, c) Resins and oils and miscellaneoususes.

Unit -II: Role of ethnobotany inmodern Medicine:

i. Role of ethnobotany in modern medicine with special example

- Rauvolfiasepentina, Trichopuszeylanicus, Artemisia annua, Withaniasomnifera.
- ii. Medico-ethnobotanical sources in India

iii. Significance of the following plants in ethnobotanical practices (along with their habitat andmorphology)

a) Azadirachtaindica, b) Ocimum sanctum, c) Vitexnegundo,
d)Gloriosasuperba, e) Tribulusterrestris,f)Phyllanthusniruri
,g)Cassauriculata, h) Indigoferatinctoria, i) Sennauriculataj).Curcuma longa

iv. Role of ethnic groups in the conservation of plant genetic resource

Unit-III: Ethnobotany as a tool to protect interests of ethnic

i. Sharing of wealth concept with few examples fromIndia.

ii. Biopiracy, Intellectual Property Rights and Traditional Knowledge

Unit -IV: History, Scope and Importance of Medicinal Plants. indigenousMedicinalSciences

i. Definition and Scope-Ayurveda: History, origin, panchamahabhutas, saptadhatu and tridosha concepts, Rasayana, plants used in ayurvedictreatments.

ii. **Siddha**: Origin of Siddha medicinal systems, Basisof Siddha system, plants used in Siddhamedicine.

iii. **Unani**: History, concept: Umoor-e- tabiya, tumors treatments/ therapy, polyherbal formulations (inbrief).

Unit -V: Conservation of endangered and endemic medicinal plants:

i. Definition: endemic and endangered medicinalplants,

ii. Red listcriteria

In situ conservation: Biosphere reserves, sacred groves,

NationalParks Ex situ conservation: BotanicalGardens.

Semester-VI , III B. Sc - BOTANY SYLLABUS SEMESTER- VIII CLUSTER ELECTIVE, Paper VIII-A-3

Paper VIII-A-3: Pharmacognosy and Phytochemistry

Unit-I:Pharmacognosy

CO1:understand the significance of secondary metabolites

CO2: learn about the Drug evalution methods

Co3: understand about different medicinal plants and their significance

Co4 : learn about Different groups of Alkaloids, biosynthesis, bioactivity.

Co5: Analyse the Pharmacological action of plant drugs – tumor inhibitors, PAF antagonists, antioxidants

LearningOutcomes:OnCompletio nofthecourse, the students will be able to	Knowledgelevel(Bloom's Taxonomy)	Average level weightage
CO1: understand the	Level1(Knowledge)	1.5
significance of secondary metabolites	Level2(Understanding)	
CO2: learn about	Level1(Knowledge)	1.5
the Drug evalution methods	Level2(Understanding)	
CO3 : understand about	Level1(Knowledge)	2
different medicinal plants and	Level2(Understanding)	
their significance	Level3(Application)	
Co4 : learn about Different groups of Alkaloids, biosynthesis, bioactivity	Level2(Understanding) Level3(Application)	3.5
	Level4(Analysing)	
	Level5(Evaluation)	
Co5: Analyse the	Level2(Understanding)	3.5
Pharmacological action of plantdrugs-tumor inhibitors,	Level3(Applying)	
PAF antagonists, antioxidants	Level4(Analysing)	
	Level5(Evaluation)	

1-Low, 2-Moderate, 3-High, '-' No Correlation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	0	1	1	0	2	1	1	3
CO2	0	0	0	0	1	2	1	2	1
CO3	1	1	1	2	2	0	0	1	2
CO4	1	1	0	1	0	2	1	0	2
CO5	3	2	2	2	2	2	3	2	2

CO-PSO Mapping

1-Low, 2-Moderate, 3-High, '-' No Correlation

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	1	2	2	1
CO2	1	2	1	2	1	1
CO3	2	2	1	3	1	1
CO4	1	1	2	2	1	1
CO5	2	1	1	1	2	3

ATTA	INMENT	OF POs
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	PROGRAM OUTCOMES ATTAINMENT									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	
CO 1	5.77959 2	0	2.889796	2.889796	0	5.779592	2.889796	2.889796	8.669388	
CO2	0	0	0	0	2.88979 6	5.779592	2.889796	5.779592	2.889796	
соз	2.85306 1	2.853061	2.853061	5.706122	5.70612 2	0	0	2.853061	5.706122	
CO4	2.74285 7	2.742857	0	2.742857	0	5.485714	2.742857	0	5.485714	
CO 5	8.22857 1	5.485714	5.485714	5.485714	5.48571 4	5.485714	8.228571	5.485714	5.485714	
INAL ATTAI IMEN	2.80058				2.81632					
Т	3	2.770408	2.807143	2.804082	7	2.816327	2.791837	2.834694	2.823673	

PROGRAM SPECIFIC OUTCOMES ATTAINMENT									
	PSO1	PSO2	PSO3	PSO4	PSO5				
CO 1	8.669388	5.779592	2.889796	5.779592	5.779592				
CO2	2.889796	5.779592	2.889796	5.779592	2.889796				
CO3	5.706122	5.706122	2.853061	8.559184	2.853061				
CO4	2.742857	2.742857	5.485714	5.485714	2.742857				
CO 5	5.485714	2.742857	2.742857	2.742857	5.485714				
FINAL ATTAINMENT	2.832653	2.843878	2.810204	2.834694	2.821574				

III B. Sc - BOTANY SYLLABUS SEMESTER- VIII CLUSTER ELECTIVE, Paper VIII-A-3 Paper VIII-A-3: Pharmacognosy and Phytochemistry

Unit-I:Pharmacognosy

Definition, Importance, Classification of drugs - Chemical and Pharmacological, Drug evaluation method: **Unit –II: Organoleptic andmicroscopicstudies:**

1. Organoleptic and microscopic studies with reference to nature of active principles and common adulterants

2. Adhatodavasica(leaf), *Strychnosnuxvomica*(seed), *Rauwolfiaserpentina*(root) and *Zinziberofficinalis* Catharanth us roseus.

Unit-III:SecondaryMetabolites:

- 1. Definition of primary and secondary metabolites and their differences, majortypes
- terpenes, phenolics, alkaloids, terpenoids, steroids.

2.A brief idea about extraction of alkaloids.Origin of secondary metabolites – detailed account of acetate pathway, mevalonate pathway, shikimatepathway.

UNIT-IV:Phytochemistry:

- 1. Biosynthesis and sources of drugs:
- 2. Phenols and phenolic glycosides : structural types, biosynthesis, importanceof simple phenolic compounds, tannins, anthraquinones, coumarins and furanocoumarins, flavones and related flavonoid glycosides, anthocyanins, betacyanins, stilbenes, lignins and lignans).
- 3. Steroids, sterols, saponins, withanolides, ecdysones, cucurbitacins:
- 4. Alkaloids: Different groups, biosynthesis, bioactivity.
- 5. Volatile oils, aromatherapy.

UNIT-V: Enzymes, proteins and amino acids as drugs:

- 1. Vaccines, toxins and toxoids, antitoxins, immune globulins, antiserums,
- 2. Vitamins, Antibiotics chemical nature, mode ofaction.
- 3. Pharmacological action of plant drugs tumor inhibitors, PAF antagonists, antioxidants, phytoestrogen andothers.
- 4. Role of different enzyme inhibitor